

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (cancelled) A crystalline composition comprising an amount of SiO₂, Al₂O₃, CaO, Fe₂O₃, TiO₂, K₂O, P₂O₅, Cr₂O₃, ZnO, MgO, Na₂O, Li₂O, CeO₂, ZrO₂ and MnO₂.
2. (cancelled) The crystalline composition of claim 1 further comprising an amount of 35.0-43.0 percent of SiO₂, 29.0-36.0 percent of Al₂O₃, 1.4-4.1 percent of Fe₂O₃, 16.0-21.0 percent of CaO, 1.3-15.2 percent of TiO₂, 0.6-8.9 percent of K₂O, 1.4-6.8 percent of P₂O₅, 0-6.0 percent of Cr₂O₃, 0-11.2 percent of ZnO, 0-1.5 percent of MnO₂, 0-10.0 percent of MgO, 0-10.2 percent of Na₂O, 0-5.0 percent of CeO₂, 0-5.0 percent of ZrO₂ and 0-10.2 percent of Li₂O by weight.
3. (cancelled) The crystalline composition of claim 1 further comprising an amount of 35.0-57.0 percent of SiO₂, 15.0-36.0 percent of Al₂O₃, 1.4-10.0 percent of Fe₂O₃, 15.0-22.0 percent of CaO, 0.6-15.2 percent of TiO₂, 0.3-11.0 percent of K₂O, 1.4-6.8 percent of P₂O₅, 0-6.0 percent of Cr₂O₃, 0-11.2 percent of ZnO, 0-11.5 percent of MnO₂, 0-10.0 percent of MgO, 0-10.2 percent of Na₂O, 0-5.0 percent of CeO₂, 0-5.0 percent of ZrO₂ and 0-10.2 percent of Li₂O by weight.
4. (cancelled) The poly-crystalline composition of claim 1, wherein the poly-crystalline composition is a non porous poly-crystalline composition.
5. (cancelled) The poly-crystalline composition of claim 1, wherein the density of the poly-crystalline composition is in the range of 2.5×10^3 to 2.9×10^3 kg/m³.
6. (cancelled) A poly-crystalline product comprising an amount of SiO₂, Al₂O₃, CaO, Fe₂O₃, TiO₂, K₂O, P₂O₅, Cr₂O₃, ZnO, MgO, Na₂O, Li₂O, CeO₂, ZrO₂ and MnO₂.

7. (cancelled) The poly-crystalline product of claim 6, further comprising an amount of 35.0-43.0 percent of SiO_2 , 29.0-36.0 percent of Al_2O_3 , 1.4-4.1 percent of Fe_2O_3 , 16.0-21.0 percent of CaO , 1.3-15.2 percent of TiO_2 , 0.6-8.9 percent of K_2O , 1.4-6.8 percent of P_2O_5 , 0-6.0 percent of Cr_2O_3 , 0-11.2 percent of ZnO , 0-1.5 percent of MnO_2 , 0-10.0 percent of MgO , 0-10.2 percent of Na_2O , 0-5.0 percent of CeO_2 , 0-5.0 percent of ZrO_2 and 0-10.2 percent of Li_2O by weight.

8. (cancelled) The crystalline product of claim 6, further comprising an amount of 35.0-57.0 percent of SiO_2 , 15.0-36.0 percent of Al_2O_3 , 1.4-10.0 percent of Fe_2O_3 , 15.0-22.0 percent of CaO , 0.6-15.2 percent of TiO_2 , 0.3-11.0 percent of K_2O , 1.4-6.8 percent of P_2O_5 , 0-6.0 percent of Cr_2O_3 , 0-11.2 percent of ZnO , 0-11.5 percent of MnO_2 , 0-10.0 percent of MgO , 0-10.2 percent of Na_2O , 0-5.0 percent of CeO_2 , 0-5.0 percent of ZrO_2 and 0-10.2 percent of Li_2O by weight.

9. (cancelled) The poly-crystalline product of claim 6, wherein the polycrystalline product is a non porous poly-crystalline product.

10. (cancelled) The poly-crystalline product of claim 6, wherein the density of the poly-crystalline composition is in the range of 2.5×10^3 to $2.9 \times 10^3 \text{ kg/m}^3$.

11. (cancelled) A process for producing a poly-crystalline composition comprising the steps of: a. Mixing an ash particle with at least one glass forming agent and at least one crystallization catalyst, b. Melting said ash particle, said at least one glass forming agent and said at least one crystallization catalyst to form a mixture; and c. Cooling the resulting mixture to ambient temperature so as to form a homogenous, non-porous poly-crystalline product comprising SiO_2 , Al_2O_3 , CaO , Fe_2O_3 , TiO_2 , K_2O , P_2O_5 , Cr_2O_3 , ZnO , MgO , Na_2O , Li_2O , CeO_2 , ZrO_2 and MnO_2 .

12. (cancelled) The process of claim 11, wherein in step C the poly-crystalline product further comprising an amount of 35.0-43.0 percent of SiO_2 , 29.0-36.0 percent of Al_2O_3 , 1.4-4.1 percent of Fe_2O_3 , 16.0-21.0 percent of CaO , 1.3-15.2 percent of TiO_2 , 0.6-8.9 percent of

K₂O, 1.4-6.8 percent of P₂O₅, 0-1.5 percent of Cr₂O₃, 0-11.2 percent of ZnO, 0-1.5 percent of MnO₂, 0-10.0 percent of MgO, 0-10.2 percent of Na₂O, 0-5.0 percent of CeO₂, 0-5.0 percent of ZrO₂ and 0-10.2 percent of Li₂O by weight.

13. (cancelled) The process of claim 11, wherein in step C the poly-crystalline product further comprising an amount of 35.0-57.0 percent of SiO₂, 15.0-36.0 percent of Al₂O₃, 1.4-10.0 percent of Fe₂O₃, 15.0-22.0 percent of CaO, 0.6-15.2 percent of TiO₂, 0.3-11.0 percent of K₂O, 1.4-6.8 percent of P₂O₅, 0-6.0 percent of Cr₂O₃, 0-11.2 percent of ZnO, 0-11.5 percent of MnO₂, 0-10.0 percent of MgO, 0-10.2 percent of Na₂O, 0-5.0 percent of CeO₂, 0-5.0 percent of ZrO₂ and 0-10.2 percent of Li₂O by weight.

14. (cancelled) The process of claim 11, wherein said at least one glass foaming agent is selected from the group consisting of SiO₂, Al₂O₃, Li₂O, MgO, Na₂O, CaO and K₂O.

15. (cancelled) The process of claim 11, wherein said at least one crystallization catalyst is selected from the group consisting of titanium dioxide, chromium oxide, zinc oxide, cerium dioxide, manganese dioxide and zirconium dioxide.

16. (cancelled) The process of claim 11, wherein in step B the ash particle, the at least one glass forming agent and the at least one crystallization catalyst are heated at the temperature range of 1400° C-1600° C.

17. (cancelled) An article of manufacture comprising SiO₂, Al₂O₃, CaO, Fe₂O₃, TiO₂, K₂O, P₂O₅, Cr₂O₃, ZnO, MgO, Na₂O, Li₂O, CeO₂, ZrO₂ and MnO₂.

18. (cancelled) The article of manufacture of claim 17, further comprising an amount of 35.0-43.0 percent of SiO₂, 29.0-36.0 percent of Al₂O₃, 1.4-4.5 percent of Fe₂O₃, 6.0-25.0 percent of CaO, 1.3-15.2 percent of TiO₂, 0.6-8.9 percent of K₂O, 1.4-6.8 percent of P₂O₅, 0-6.0 percent of Cr₂O₃, 0-5.2 percent of ZnO, 0-5.5 percent of MnO₂, 0-10.0 percent of MgO, 0-10.2 percent of Na₂O, 0-5.0 percent of CeO₂, 0-5.0 percent of ZrO₂ and 0-10.2 percent of Li₂O by weight.

18. (cancelled) The article of manufacture of claim 17, further comprising an amount of 35.0-57.0 percent of SiO_2 , 15.0-36.0 percent of Al_2O_3 , 1.4-10.0 percent of Fe_2O_3 , 15.0-22.0 percent of CaO , 0.6-15.2 percent of TiO_2 , 0.3-11.0 percent of K_2O , 1.4-6.8 percent of P_2O_5 , 0-6.0 percent of Cr_2O_3 , 0-11.2 percent of ZnO , 0-11.5 percent of MnO_2 , 0-10.0 percent of MgO , 0-10.2 percent of Na_2O , 0-5.0 percent of CeO_2 , 0-5.0 percent of ZrO_2 and 0-10.2 percent of Li_2O by weight.

19. (cancelled) The article of manufacture of claim 17, wherein the article of manufacture is a non-porous article of manufacture.

20. (cancelled) The article of manufacture of claim 17, wherein the density of the article of manufacture is in the range of 2.5×10^3 to $2.9 \times 10^3 \text{ kg/m}^3$.

21. (cancelled) A poly-crystalline product that is produced by a process comprising the steps of: a. Mixing ash particle with at least one glass forming agent and at least one crystallization catalyst, b. Melting said ash particle, said at least one glass forming agent and said at least one crystallization catalyst to form a mixture; and c. Cooling the resulting mixture to ambient temperature to form a homogenous, non-porous microcrystalline composition comprising SiO_2 , Al_2O_3 , CaO , Fe_2O_3 , TiO_2 , K_2O , P_2O_5 , Cr_2O_3 , ZnO , MgO , Na_2O , Li_2O , CeO_2 , ZrO_2 and MnO_2 .

22. (cancelled) The poly-crystalline product of claim 21, wherein in step C said microcrystalline composition further comprising an amount of 35.0-43.0 percent of SiO_2 , 29.0-36.0 percent of Al_2O_3 , 1.4-4.1 percent of Fe_2O_3 , 16.0-21.0 percent of CaO , 1.3-15.2 percent of TiO_2 , 0.6-8.9 percent of K_2O , 1.4-6.8 percent of P_2O_5 , 0-6.0 percent of Cr_2O_3 , 0-11.2 percent of ZnO , 0-1.5 percent of MnO_2 , 0-10.0 percent of MgO , 0-10.2 percent of Na_2O , 0-5.0 percent of CeO_2 , 0-5.0 percent of ZrO_2 and 0-10.2 percent of Li_2O by weight.

23. (cancelled) The poly-crystalline product of claim 21, wherein in step C said microcrystalline composition further comprising an amount of 35.0-57.0 percent of SiO_2 ,

15.0-36.0 percent of Al_2O_3 , 1.4-10.0 percent of Fe_2O_3 , 15.0-22.0 percent of CaO , 0.6-15.2 percent of TiO_2 , 0.3-11.0 percent of K_2O , 1.4-6.8 percent of P_2O_5 , 0-6.0 percent of Cr_2O_3 , 0-11.2 percent of ZnO , 0-11.5 percent of MnO_2 , 0-10.0 percent of MgO , 0-10.2 percent of Na_2O , 0-5.0 percent of CeO_2 , 0-5.0 percent of ZrO_2 and 0-10.2 percent of Li_2O by weight.

24. (cancelled) The poly-crystalline product of claim 21, wherein the density of the poly-crystalline composition is in the range of 2.5×10^3 to $2.9 \times 10^3 \text{ kg/m}^3$.

25. (cancelled) The poly-crystalline product of claim 21, wherein the poly-crystalline product is a non-porous poly-crystalline product.

26. (cancelled) The poly-crystalline product of claim 21, wherein said at least one glass is selected from the group consisting of SiO_2 , Al_2O_3 , Li_2O , MgO , Na_2O , CaO , K_2O .

27. (cancelled) The poly-crystalline product of claim 21, wherein said at least one crystallization catalyst is selected from the group consisting of titanium dioxide, chromium oxide, zinc oxide, cerium dioxide, manganese dioxide and zirconium dioxide.

28. (cancelled) The poly-crystalline product of claim 21, wherein in step B said ash particle, said at least one glass forming agent and said at least one crystallization catalyst are heated at the temperature range of 1400°C .- 1600°C .

32. (cancelled) The poly-crystalline product of claim 21, wherein said fly ash particle is about 25-90 percent, said glass forming agent is about 5-70 percent and said crystallization catalyst is about 0-15 percent on a dry basis of the poly-crystalline product.

33. (new) A solid composition comprising:

between about 25.0% and about 57.0% by weight SiO_2 ;

between about 29.0% and about 45.0% by weight Al_2O_3 ;

between about 0.3% and about 10% by weight Fe_2O_3 ;

- between about 5.4% and about 34.0% by weight CaO;
between about 0.6% and about 24.0% by weight TiO₂;
between about 0.2% and about 15.0% by weight K₂O; and
between about 0.3% and about 13.0% by weight P₂O₅
wherein the composition is ceramic.
34. (new) The composition of claim 33 comprising at least about 35.0% by weight SiO₂.
35. (new) The composition of claim 33 comprising less than about 50.0% by weight SiO₂.
36. (new) The composition of claim 33 comprising at least about 30.0% by weight Al₂O₃.
37. (new) The composition of claim 33 comprising less than about 36.0% by weight Al₂O₃.
38. (new) The composition of claim 33 comprising at least about 1.4% by weight Fe₂O₃.
39. (new) The composition of claim 33 comprising less than about 6.0% by weight Fe₂O₃.
40. (new) The composition of claim 33 comprising at least about 10.0% by weight CaO.
41. (new) The composition of claim 33 comprising less than about 30.0% by weight CaO.
42. (new) The composition of claim 33 comprising at least about 1.3% by weight TiO₂.

43. (new) The composition of claim 33 comprising less than about 15.2% by weight TiO_2 .

44. (new) The composition of claim 33 comprising at least about 0.3% by weight K_2O .

45. (new) The composition of claim 33 comprising less than about 11% by weight K_2O .

46. (new) The composition of claim 33 comprising at least about 1.4% by weight P_2O_5 .

47. (new) The composition of claim 33 comprising less than about 6.8% by weight P_2O_5 .

48. (new) An article of manufacture comprising a ceramic, said ceramic including

between about 25.0% and about 57.0% by weight SiO_2 ;

between about 29.0% and about 45.0% by weight Al_2O_3 ;

between about 0.3% and about 10% by weight Fe_2O_3 ;

between about 5.4% and about 34.0% by weight CaO ;

between about 0.6% and about 24.0% by weight TiO_2 ;

between about 0.2% and about 15.0% by weight K_2O ; and

between about 0.3% and about 13.0% by weight P_2O_5 .

49. (new) The article of claim 48 comprising greater than about 35.0% by weight SiO_2 .

50. (new) The article of claim 48 comprising less than about 50.0% by weight SiO_2 .

51. (new) The article of claim 48 comprising greater than about 30.0% by weight Al_2O_3 .

52. (new) The article of claim 48 comprising less than about 36.0% by weight Al_2O_3 .
53. (new) The article of claim 48 comprising greater than about 1.4% by weight Fe_2O_3 .
54. (new) The article of claim 48 comprising less than about 6.0% by weight Fe_2O_3 .
55. (new) The article of claim 48 comprising greater than about 10.0% by weight CaO .
56. (new) The article of claim 48 comprising less than about 30.0% by weight CaO .
57. (new) The article of claim 48 comprising greater than about 1.3% by weight TiO_2 .
58. (new) The article of claim 48 comprising less than about 15.2% by weight TiO_2 .
59. (new) The article of claim 48 comprising greater than about 0.3% by weight K_2O .
60. (new) The article of claim 48 comprising less than about 11% by weight K_2O .
61. (new) The article of claim 48 comprising greater than about 1.4% by weight P_2O_5 .
62. (new) The article of claim 48 comprising less than about 6.8% by weight P_2O_5 .

63. (new) A solid composition comprising a plurality of oxides, said oxides selected from the group consisting essentially of group II oxides, group III oxides, group IV oxides, group V oxides and lanthanoid oxides and having

between about 25.0% and about 57.0% by weight SiO_2 ;

between about 24.0% and about 45.0% by weight Al_2O_3 ;

between about 0.3% and about 10% by weight Fe_2O_3 ;

between about 5.4% and about 34.0% by weight CaO ;

between about 0.6% and about 24.0% by weight TiO_2 ;

between about 0.2% and about 15.0% by weight K_2O ; and

between about 0.3% and about 13.0% by weight P_2O_5

wherein the composition is ceramic and substantially devoid of ZnO .

64. (new) An article of manufacture comprising the ceramic of claim 63.

65. (new) A solid composition comprising:

between about 25.0% and about 57.0% by weight SiO_2 ;

between about 24.0% and about 45.0% by weight Al_2O_3 ;

between about 0.3% and about 10% by weight Fe_2O_3 ;

between about 28.0% and about 34.0% by weight CaO ;

between about 0.6% and about 24.0% by weight TiO_2 ;

between about 0.2% and about 15.0% by weight K_2O ; and

between about 0.3% and about 13.0% by weight P_2O_5

wherein the composition is ceramic.

Appl. No. 10/047,395
Amdt. Dated February 23, 2004
Reply to Office Action of November 6, 2003

66. (new) An article of manufacture comprising the ceramic of claim 65.